

Influencing Leave No Trace Behavioral Intent in National Park Visitors

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Study location – Rocky Mountain National Park

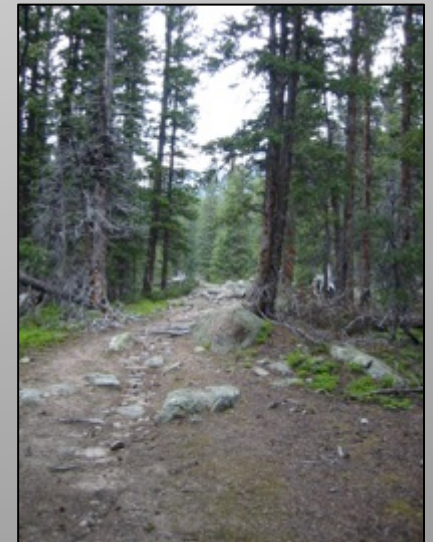
- Northern Colorado
- Annual visitation: ~ 3.5 million
- 266,000 acre park
- Designated Wilderness
- Heavy day use
- Robust visitor education



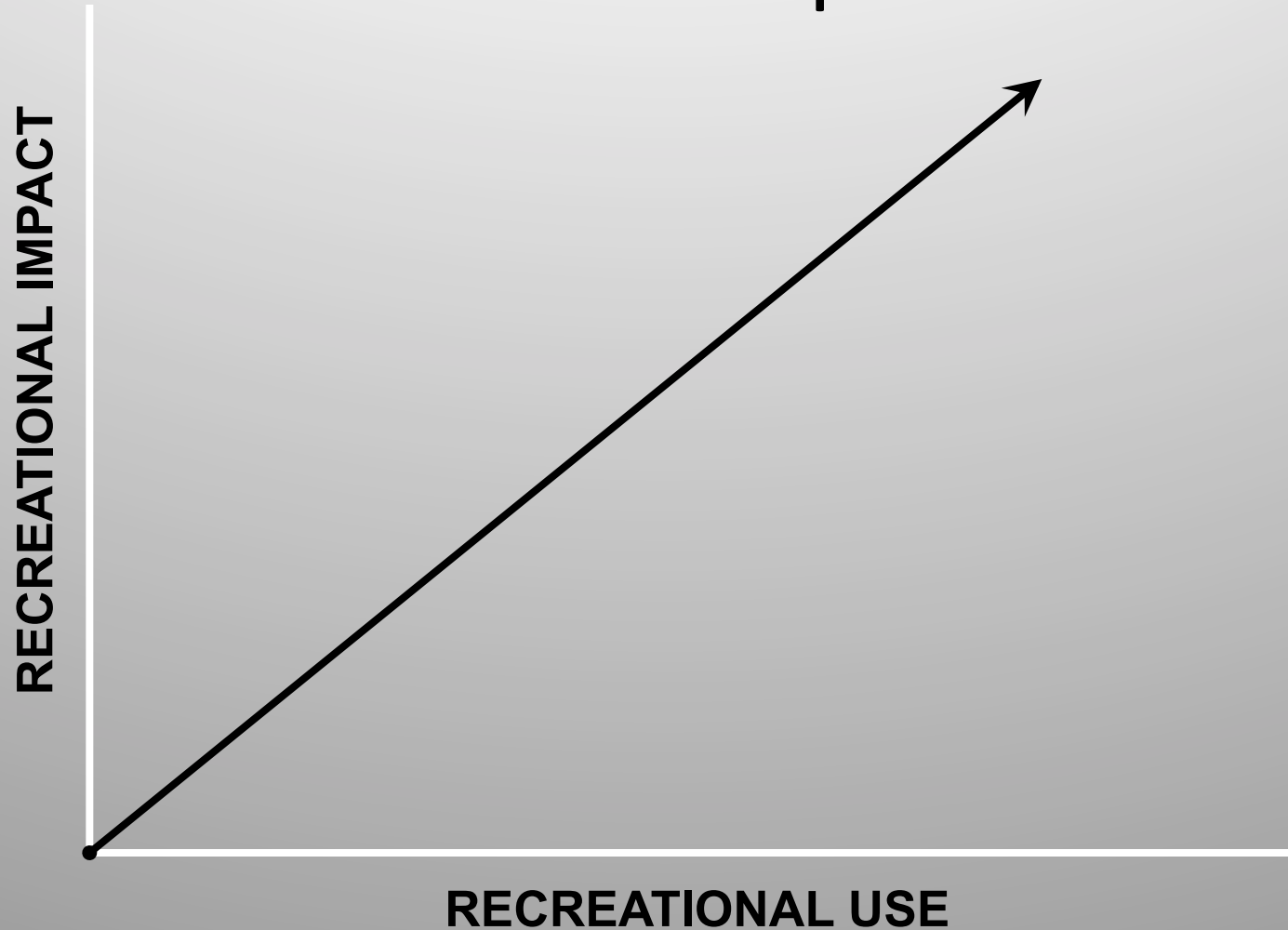
Study Background

- Resource degradation due to inappropriate visitor behavior is a significant concern for park and protected areas managers.
- Managers must utilize a variety of strategies to minimize these impacts such as Leave No Trace education.
- In many parks and protected areas, frontcountry locations are where managers direct most visitors, yet there is little information pertaining to the attitudes frontcountry visitors have towards Leave No Trace related behaviors and practices.
- This study addresses day-use visitor's knowledge, behavior and beliefs concerning Leave No Trace practices in the Bear Lake corridor of Rocky Mountain National Park.

Resource Impacts

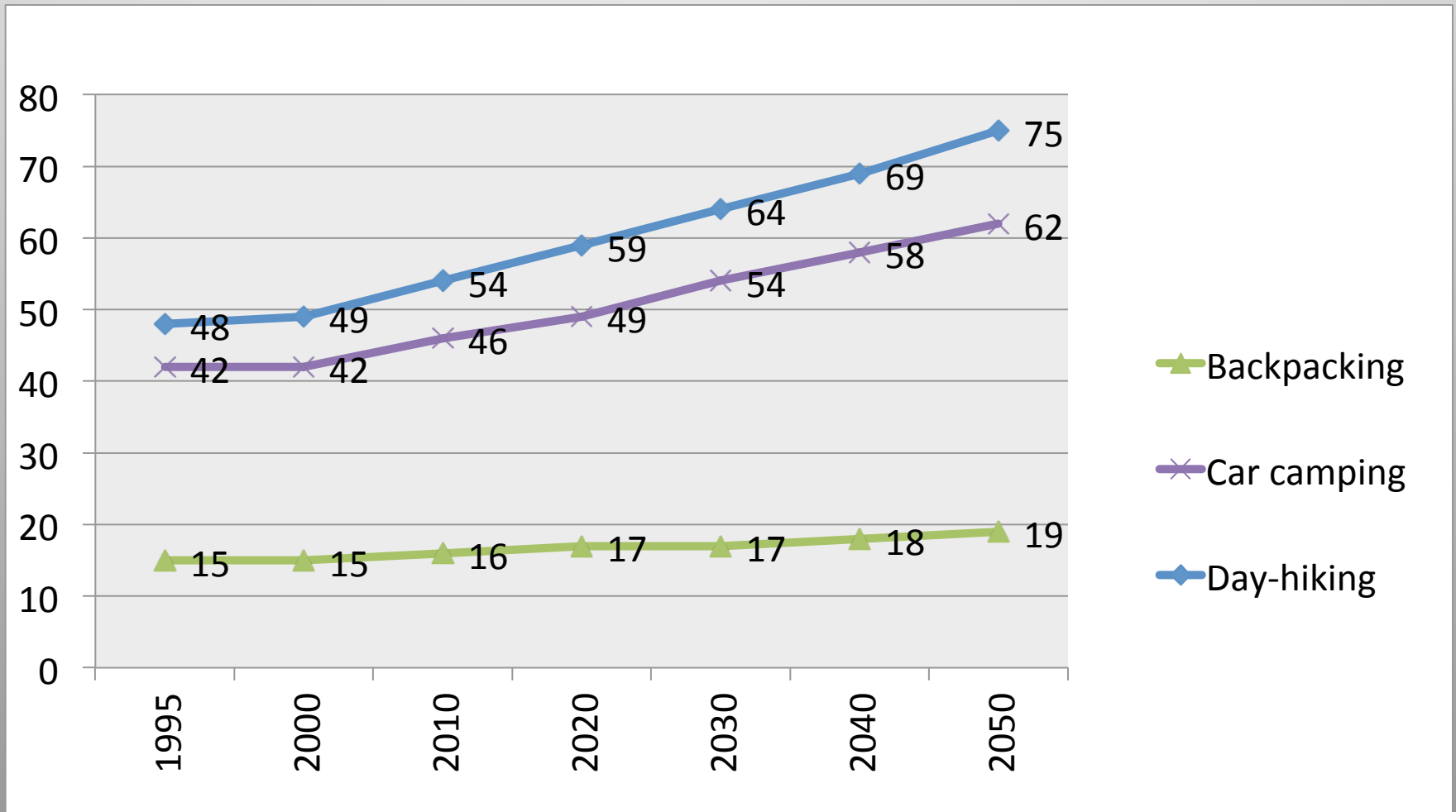


Hypothetical relationship: use and impact



(Hammitt and Cole 1998)

National Participant Growth Projections (millions)



Source: Outdoor Industry Foundation 2010- 2014

Annual Federal Land Use

USFS – 180 million visits per year



BLM – 60 million visits per year



NPS – 280 million visits per year



FWS – 40 million visits per year



Army Corps – 335 million visits per year





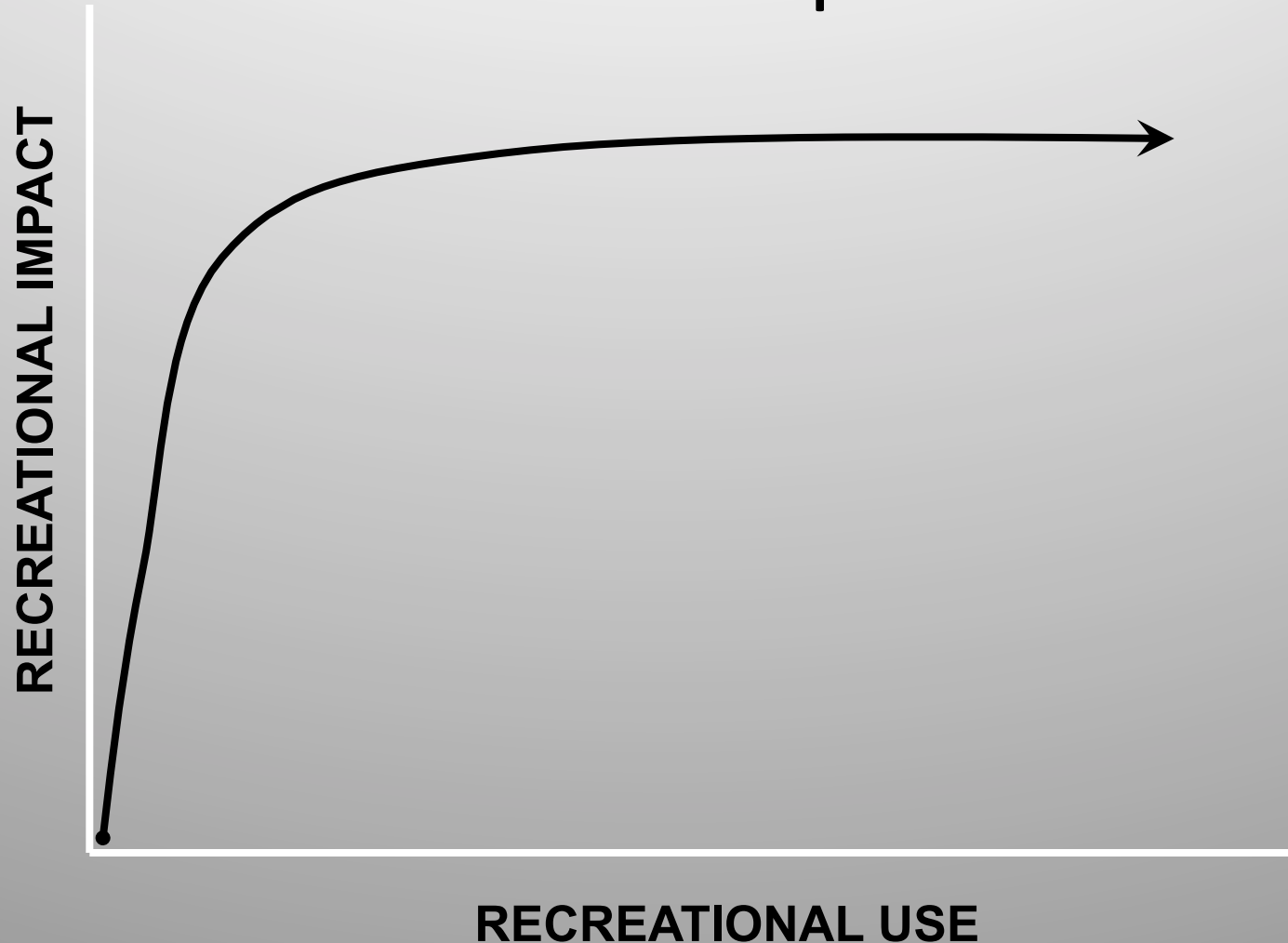








Hypothetical relationship: use and impact



Leave No Trace Background

- Concept originated in federally protected wilderness areas after the passage of the Wilderness Act in 1964.
- Initial focus was educating wilderness visitors about their impacts.
- There was little national leadership, no interagency coordination in the 1970's and 1980's.
- By the early 1990's the USDA Forest Service chose the name "Leave No Trace" for the national effort.
- National Park Service, Bureau of Land Management and the US Fish & Wildlife Service joined the effort.
- In 1994 the Leave No Trace Center for Outdoor Ethics was founded to run national outreach, education and training efforts.

Leave No Trace Today

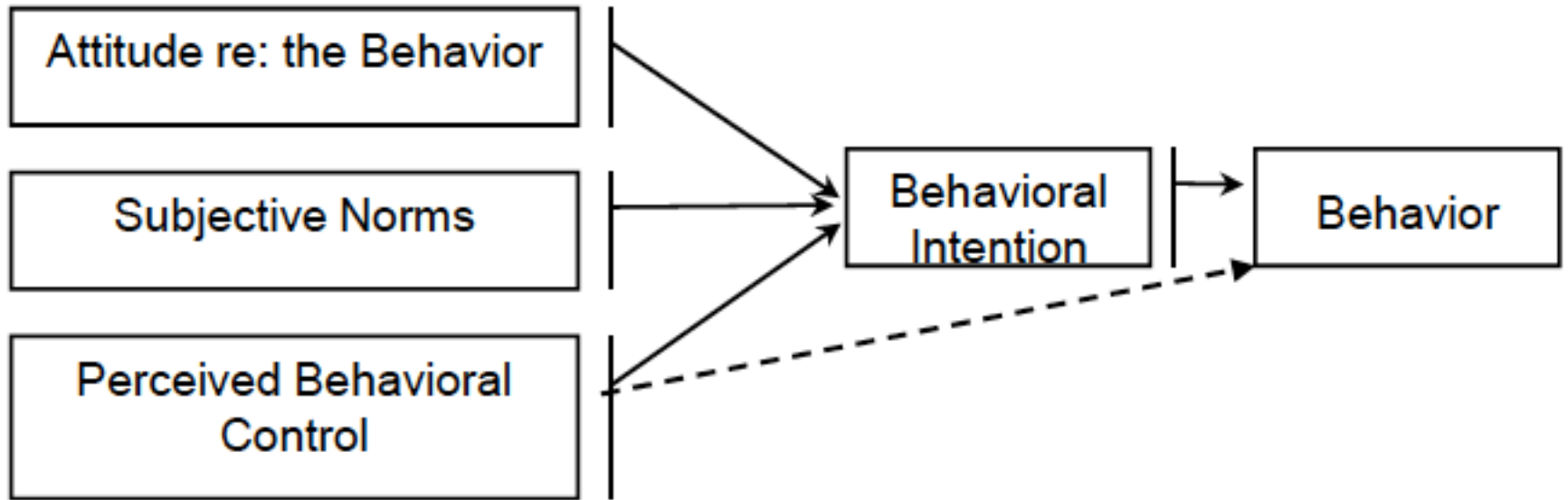


- The Center partners with land management agencies, NGO's, colleges, universities, equipment manufacturers outfitter/guides, and individuals to **“teach people how to enjoy the outdoors responsibly.”**
- The Center is based in Boulder, CO and has 20 staff members.
- The Center educates outdoor enthusiasts, connects them to the outdoors and helps protect shared lands enjoyed for recreation.

Theoretical Foundation

- The **Theory of Planned Behavior** (TPB) has often been applied to human dimensions of natural resource science (Fishbein & Manfredo, 1992; Manfredo, Teel, & Bright, 2004; Marion & Reid, 2007; Vagias & Powell, 2010).
- Both theory and previous research suggest **that attitudes influence behavior**, and one's attitude towards a specific behavior can govern his or her actions (Ajzen, 1991; Ajzen & Fishbein, 1980; Fishbein & Manfredo, 1992).
- The overarching assertion of TPB is that individuals make rational decisions and that **the most accurate predictor of their behavior is the intention** to engage in said behavior (Vagias, 2009).

Theoretical Foundation



Theory of Planned Behavior (adapted from Ajzen, 1991)

Hypothesis

We hypothesized that **future Leave No Trace behavioral intent** would be influenced by:

- **Attitudes**
- Perceived **effectiveness**
- Perceived **difficulty**
- **Self-described knowledge** of Leave No Trace

Variables

- **Independent variables**

- Attitudes towards Leave No Trace
- Perceived effectiveness of Leave No Trace
- Perceived difficulty of Leave No Trace
- Self-described Leave No Trace knowledge

- **Dependent variables**

- Likelihood of engaging in six different Leave No Trace behaviors in the future

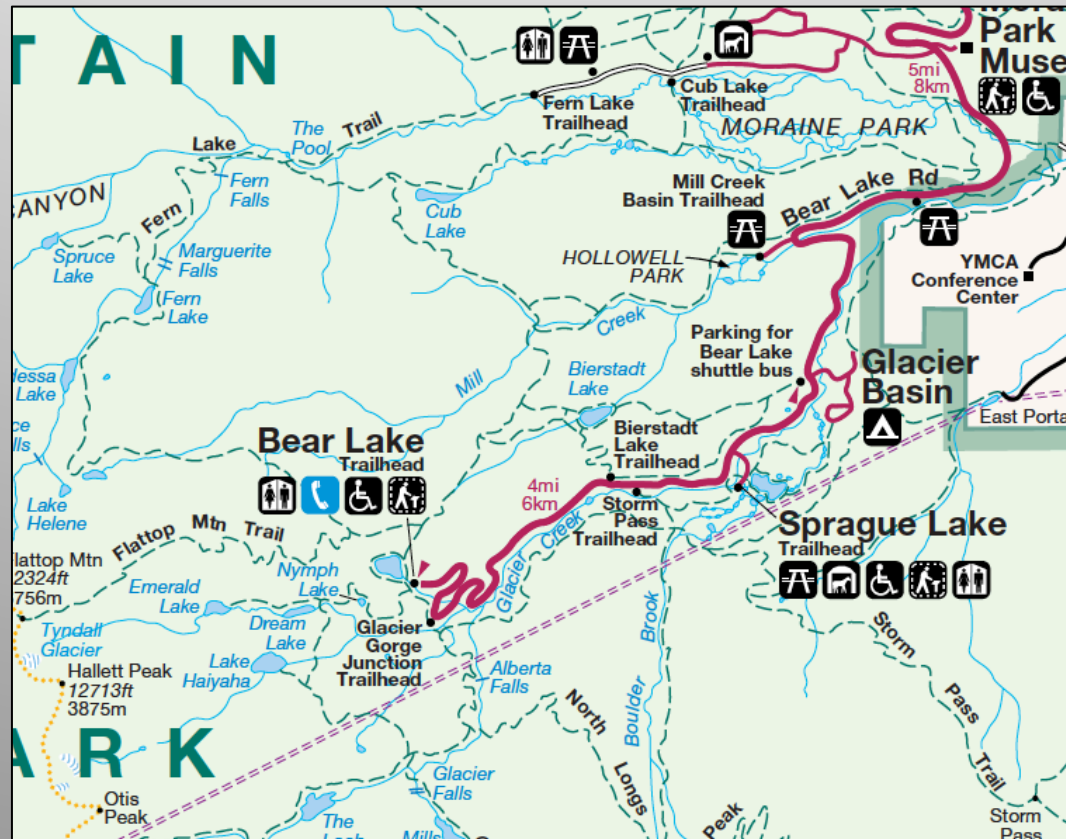
Methods

- On-site visitor survey
 - July 15 – August 15, 2009
 - n = 390
 - Response rate = 74%
- Two high-use trailheads were surveyed*
 - Glacier Gorge Trailhead
 - Bear Lake Trailhead

** No significant difference in responses from the two samples so results were combined for analysis purposes.*

Data collection at two sites in the Park

- Glacier Gorge Trailhead
- Bear Lake Trailhead



Attitudes Towards Leave No Trace

Table 1.
Attitudes towards frontcountry Leave No Trace practices¹

	N	Mean	S.D.	Percentage		
How APPROPRIATE or INAPPROPRIATE do you think the following activities are for a visitor to do in Rocky Mtn. National Park...				Very Inappropriate	Neutral	Very Appropriate
Experience nature by not preparing for weather/hazards	388	2.51	1.9	65	24	12
Travel off trail to experience nature	388	2.62	1.9	61	29	11
Carry out all litter, leaving only food scraps	388	4.64	2.7	33	12	55
Keep a single item like a rock, plant, stick or feather as a souvenir	388	2.25	1.6	66	28	6
Drop food on the ground to provide wildlife a food source	388	1.43	1.2	92	4	4
Take a break along the edge of a trail	387	5.48	1.6	7	32	61

1. Attitudes measured on a 7-point scale (1 = very inappropriate to 7 = very appropriate).

Perceived Effectiveness of Leave No Trace

Table 2.
Perceived level of effectiveness of Leave No Trace practices¹

	N	Mean	S.D.	Percentage		
Participating in the following activities in Rocky Mtn. National Park would reduce impact...				Never	Sometimes	Every time
Prepare for all types of weather, hazards and emergencies before getting on trail	387	6.02	1.16	1	28	71
Stay on designated or established trails	382	6.38	0.97	1	15	84
Carry out all littler, even crumbs, peels or cores	386	6.75	0.71	1	5	94
Never removing objects from the area, not even a small item like a rock, plant or stick	387	6.05	1.51	4	19	76
Never approach, feed or follow wildlife	388	6.19	1.54	6	11	83
Take breaks away from the trail and other visitors	387	4.57	1.88	17	44	39

1. Perceived effectiveness measured on a 7-point scale (1 = never effective to 7 = effective every time).

Perceived Difficulty of Leave No Trace

Table 3.
Perceived difficulty of practicing Leave No Trace¹

	N	Mean	S.D.	Percentage		
Please indicate how DIFFICULT you think each of the following would be for a visitor to do in Rocky Mtn. National Park...				Not at all Difficult	Moderately Difficult	Extremely Difficult
Prepare for all types of weather, hazards and emergencies before getting on trail	387	2.65	1.56	54	42	5
Stay on designated or established trails	382	1.62	1.14	86	11	3
Carry out all littler, even crumbs, peels or cores	386	1.14	0.96	90	9	1
Never removing objects from the area, not even a small item like a rock, plant or stick	387	1.52	1.10	88	11	1
Never approach, feed or follow wildlife	388	1.61	1.22	85	12	3
Take breaks away from the trail and other visitors	387	2.12	1.39	68	30	2

1. Perceived difficulty measured on a 7-point scale (1 = not at all difficult to 7 = extremely difficult).

Self-reported Knowledge of Leave No Trace

Table 4.
Level of self-described Leave No Trace knowledge

N	Mean	S.D.	Percentage						
			No Knowledge	Very Limited	Limited	Average	Above Average	Extensive	Expert
			0	1	2	3	4	5	6
383	3.45	1.74	11%	7%	7%	16%	27%	25%	7%

Behavioral Intentions to Practice Leave No Trace

Table 5.

Behavioral intentions to practice Leave No Trace in the future¹

	N	Mean	S.D.	Percentage		
Please indicate how LIKELY you are to do the following activity in the future...				Not at all Likely	Moderately Likely	Extremely Likely
Prepare for all types of weather, hazards and emergencies before getting on trail	384	5.95	1.34	2	29	70
Stay on designated or established trails	382	6.22	1.18	1	19	80
Carry out all littler, even crumbs, peels or cores	378	6.70	0.89	1	6	93
Never removing objects from the area, not even a small item like a rock, plant or stick	379	6.09	1.60	6	16	78
Never approach, feed or follow wildlife	380	6.00	1.74	8	14	78
Take breaks away from the trail and other visitors	380	4.87	1.79	12	47	41

1. Behavioral intentions measured on a 7-point scale (1 = not at all likely to 7 = extremely likely).

Predicting Future Leave No Trace Behavioral Intent

Table 6.
Predicting future Leave No Trace behavior¹

Future Behavior	Appropriateness	Effectiveness	Difficulty	Knowledge	R ²
Preparing for all types of weather, hazards and emergencies	-.11*	.36**	.17	.17	.29
Staying on designated or established trails	-.25**	.40**	-.07	.06	.34
Carrying out all litter, including food scraps	-.07	.33**	-.19*	.01	.18
Not removing natural objects from the area	-.19**	.21**	-.14*	.12*	.17
Not feeding, following or approaching wildlife	-.08	.26**	-.12*	.14*	.15
Taking breaks away from trails and other visitors	-.03	.25**	-.16**	.13*	.12

1. Cell entries are standardized regression coefficients — * $p < .05$, ** $p < .001$

Conclusions

- Results supported the hypothesis that future behavior would be influenced by attitudes, perceived effectiveness, perceived difficulty and knowledge.
- Most respondents indicated they were likely to practice Leave No Trace in the future ($M \geq 4.87$ in all cases).
- Of the independent variables, **perceived effectiveness** was the most significant predictor of future intent to engage in Leave No Trace behaviors.

Management Implications

- Visitors need to understand that resource degradation is occurring, and need to know how it can be minimized or avoided.
- Park and protected area visitors need to understand *why* they are being asked to practice Leave No Trace and how it benefits the resource.
- Both park managers and the Leave No Trace Center for Outdoor Ethics should focus educational efforts on the **effectiveness** of recommended Leave No Trace practices in order to influence future behavior.

Application of Findings

➤ Grand Canyon National Park in 2014-2015



2. Restrooms Are Available Along the Trails — Use Them

Why? Proper disposal of human waste prevents water pollution, avoids the negative implications of someone else finding it, and minimizes the possibility of spreading disease.

- Plan ahead, locate the restrooms on the [Corridor Trails Map](#) before you start down a trail.
- Or, deposit human waste in catholes. Go 200 feet (61m) from water, trail, and campsite.
- Dig a 6-inch (15 cm) deep hole, 4-6 inches (10-15 cm) in diameter. Bury your waste.
- Use resealable plastic bags to carry out your toilet paper and tampons.



7. Pack Out Your Trash

Why? Litter left in the canyon takes years to decompose. Packing out all of your trash helps to preserve the natural environment.

- Place your trash in resealable plastic bags that you can carry in your pack.
- Pack out everything you pack into Grand Canyon.

Future Research

- Many past Leave No Trace-focused studies have utilized increased knowledge as the primary measure of efficacy (Vagias, 2009).
- However, individual's behavior is largely determined more by attitudes than by knowledge (Ajzen, 1991).
- According to Kaiser, Wolfing and Fuhrer (1999), attitudes are far more important than knowledge in environmental contexts.
- This indicates a need to undertake Leave No Trace-oriented studies that address the **attitudes and perceptions towards effectiveness of practices** rather than knowledge of specific Leave No Trace practices.

Questions



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